United States Patent [19]

Stoner

[11] **Patent Number: 4,942,802**

[45] **Date of Patent: Jul. 24, 1990**

[54] **CONVERTIBLE, BELT/CLIP-FED AUTOMATIC GUN WITH POSITIVE SHELL CASING EJECTION**

[75] Inventor: **Eugene M. Stoner**, Palm City, Fla.

[73] Assignee: **ARES, Inc.**, Port Clinton, Ohio

[21] Appl. No.: **100,388**

[22] Filed: **Sep. 24, 1987**

[51] **Int. Cl.**[5] **F41D 10/14**

[52] **U.S. Cl.** **89/191.01**; 89/33.14; 42/25

[58] **Field of Search** 89/191.01, 33.14, 33.2, 89/185, 33.1; 42/25, 50

[56] **References Cited**

U.S. PATENT DOCUMENTS

709,882	9/1902	DeKnight	89/33.14
1,290,850	1/1919	Sturgeon	89/33.1
1,343,444	6/1920	Formby	42/50
1,696,537	12/1928	Kewish	89/185
1,803,349	5/1931	Pfeiffer	89/33.2
2,466,564	4/1949	Stephenson	89/33.2
3,198,076	8/1965	Stoner	89/33.1
3,386,336	6/1968	Roy	89/33.2
3,455,204	7/1969	Stoner	89/33.2
3,680,432	8/1972	Rocha	89/33.2
3,960,053	6/1976	Conley	89/185
4,112,817	9/1978	Bourlet	89/33.1

FOREIGN PATENT DOCUMENTS

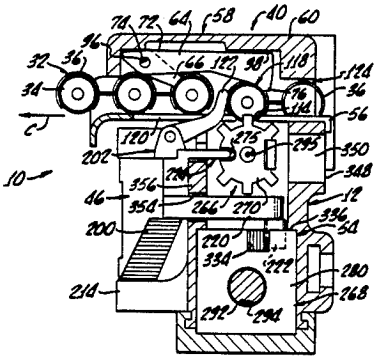
504332	4/1920	France	89/33.2

Primary Examiner—Deborah L. Kyle
Assistant Examiner—Stephen Johnson
Attorney, Agent, or Firm—Allan R. Fowler

[57] **ABSTRACT**

An automatic gun comprises a barrel, a receiver connected to the barrel and a bolt and bolt carrier mounted in the receiver for recoil and counterrecoil movement between the barrel breech and a recoil position rearwardly of a shell pick up position and a casing ejection port. The bolt carrier has a cam track formed along it and the bolt has a pivotally mounted casing extractor and an ejection recess in an opposite region. The forward end of a cam follower is pivotally mounted to the receiver forwardly of the pick up position. The follower has a pair of belt feeding pawls mounted centrally, an inwardly-directed ejection tip at the rearward end and a cam track follower in engagement with the bolt carrier cam track. A belt feeding adaptor is detachably connected to the receiver above the cam follower for receiving an ammunition belt. In response to forward bolt carrier movement, the cam follower is pivoted outwardly, moving the feed pawls into engagement with a belted shell outboard of the pick up position. Corresponding forward bolt movement strips a shell from the pick up position and loads it into the breech. When the bolt carrier recoils after firing, the cam follower pivots inwardly and the feed pawls advance the belt one shell position. As the cam follower pivots inwardly, its ejection tip moves into the ejection recess in the bolt and causes ejection of a shell casing held to the bolt face by the extractor. An ammunition clip adapator is interchageable with the belt feeding adapter.

22 Claims, 7 Drawing Sheets



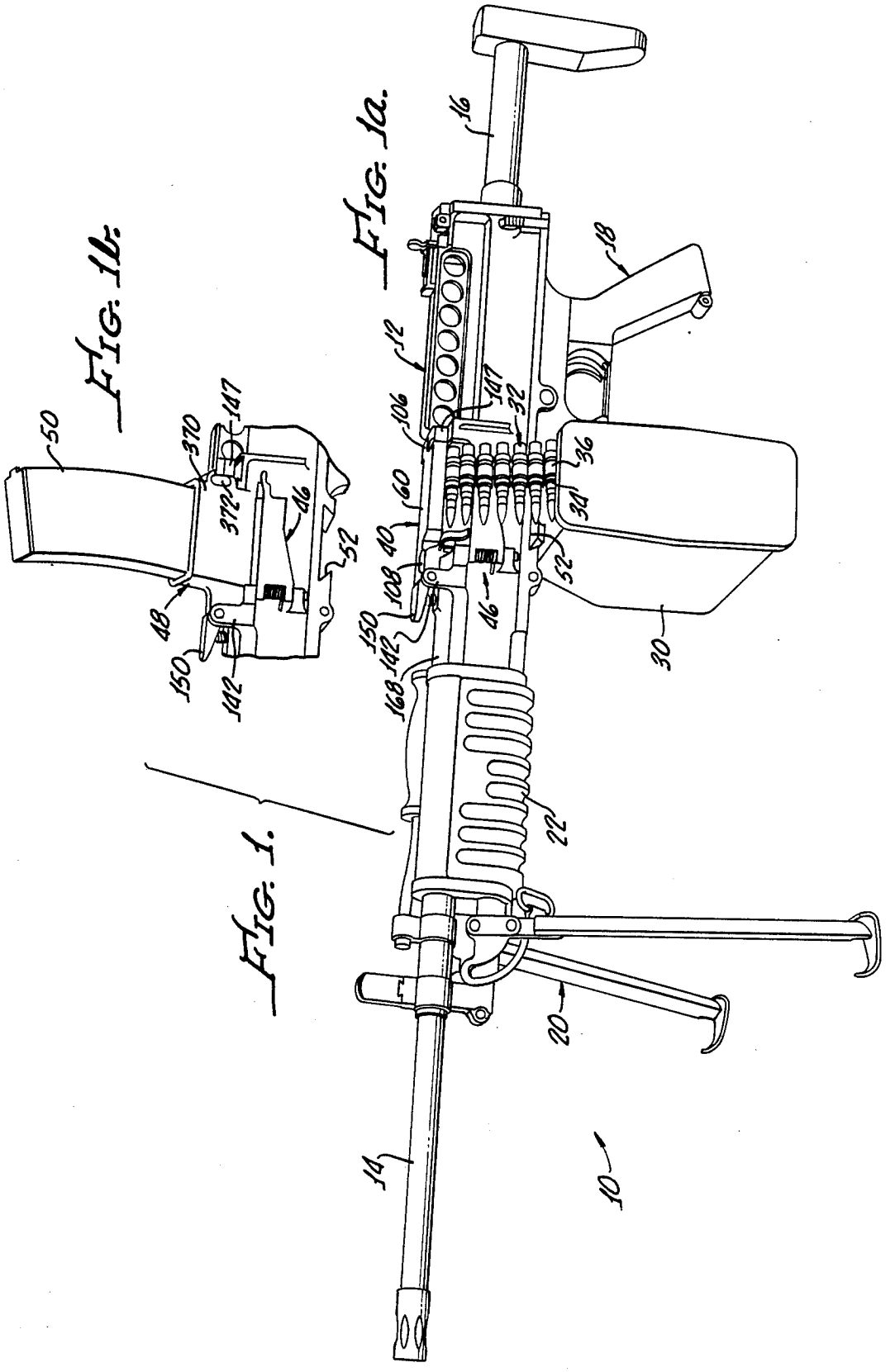
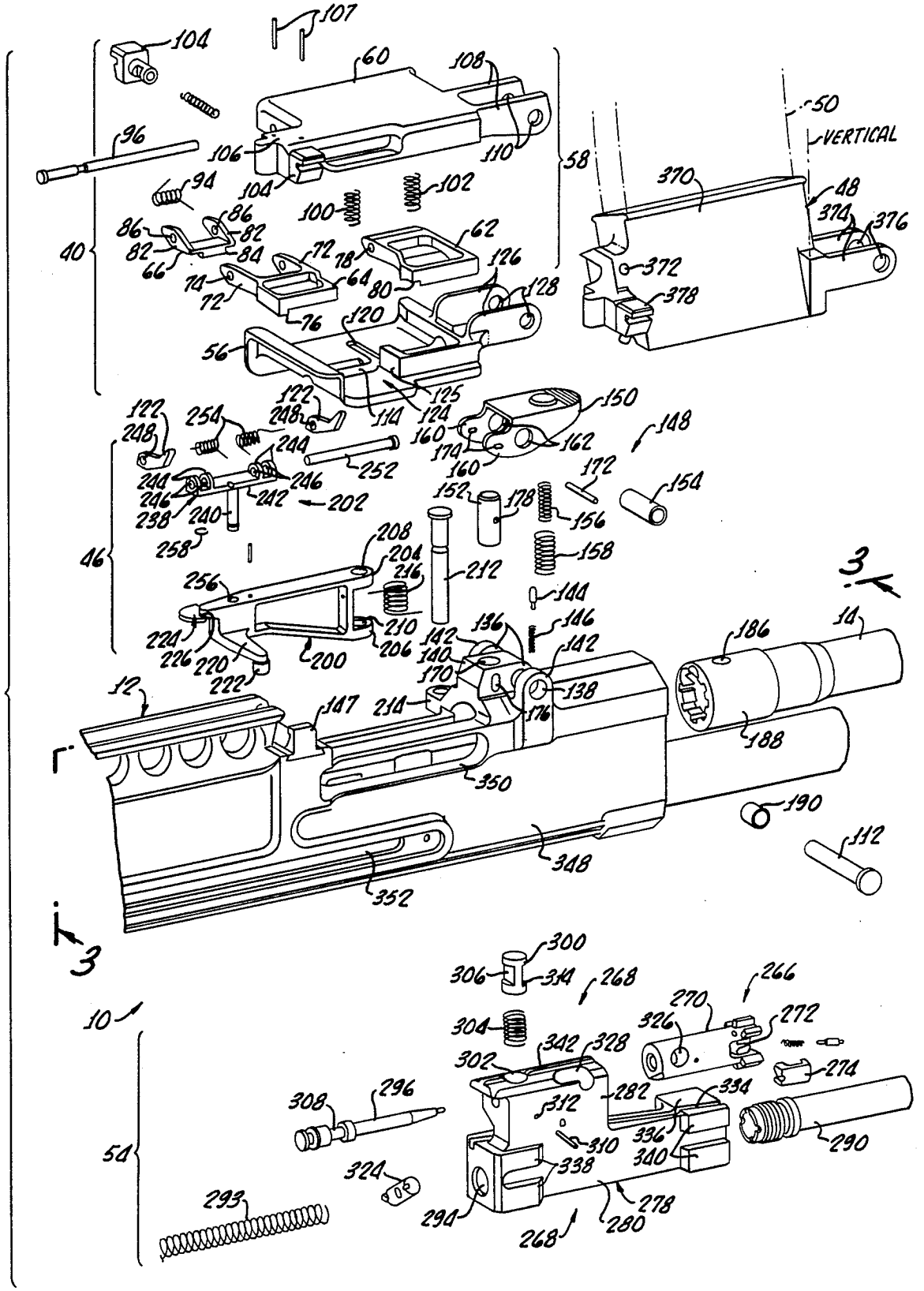


FIG. 1a.

FIG. 1b.

FIG. 1.

FIG. 2.


107
104
60
108
50
VERTICAL
96
106
110
58
94
102
100
370
48
374
376
86
82
84
62
40
66
74
72
78
64
80
126
128
372
378
76
120
56
122
248
254
244
252
150
148
160
162
246
242
202
238
240
258
152
178
156
154
172
208
204
216
212
158
46
256
144
224
226
220
222
200
206
210
142
140
170
136
146
138
176
3
1A
186
12
147
214
188
350
190
348
112
352
3
300
306
314
268
266
10
304
270
326
272
342
328
302
274
308
296
282
334
312
310
336
340
290
54
324
338
293
294
278
280
268

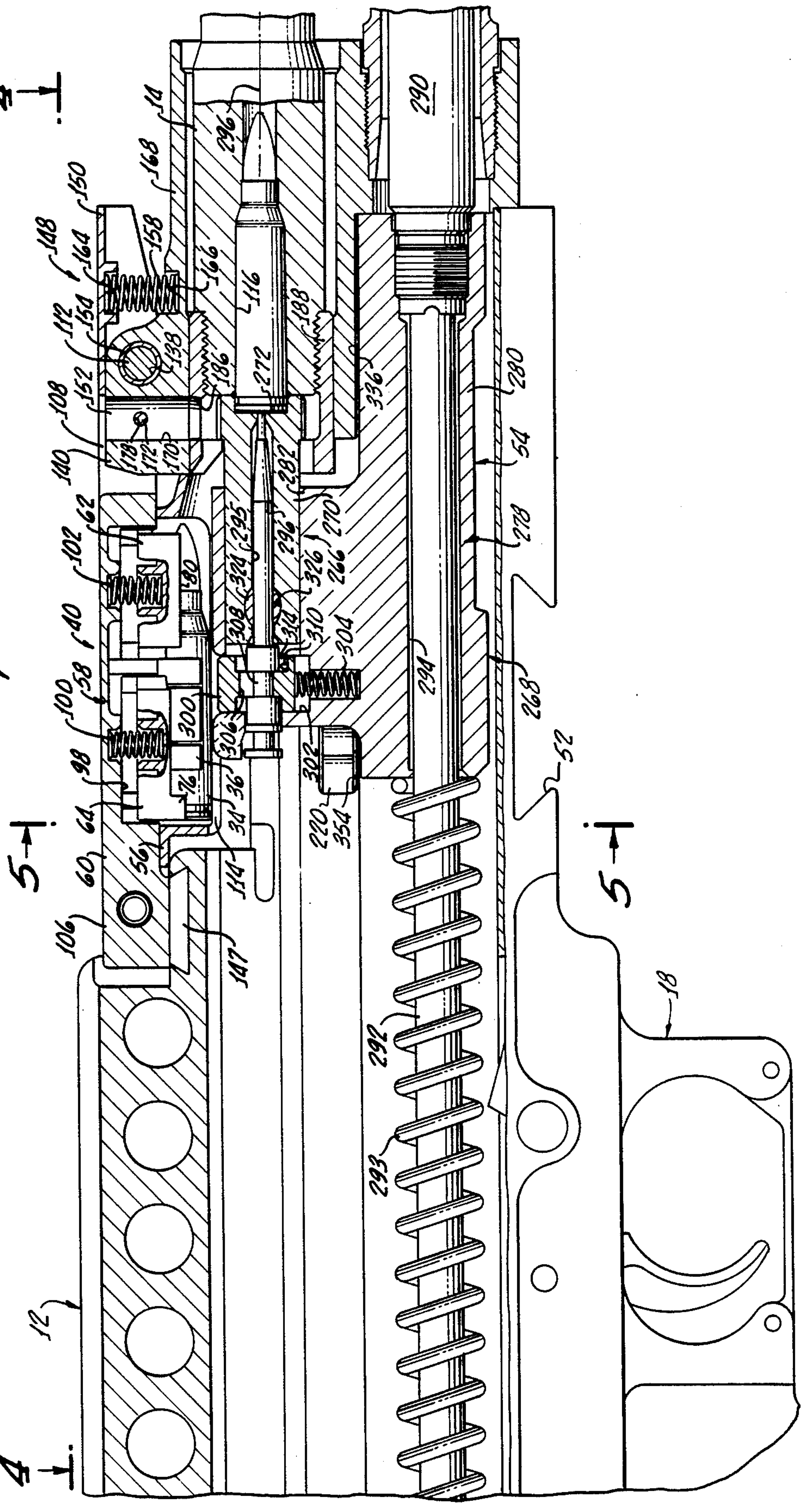


FIG. 3.

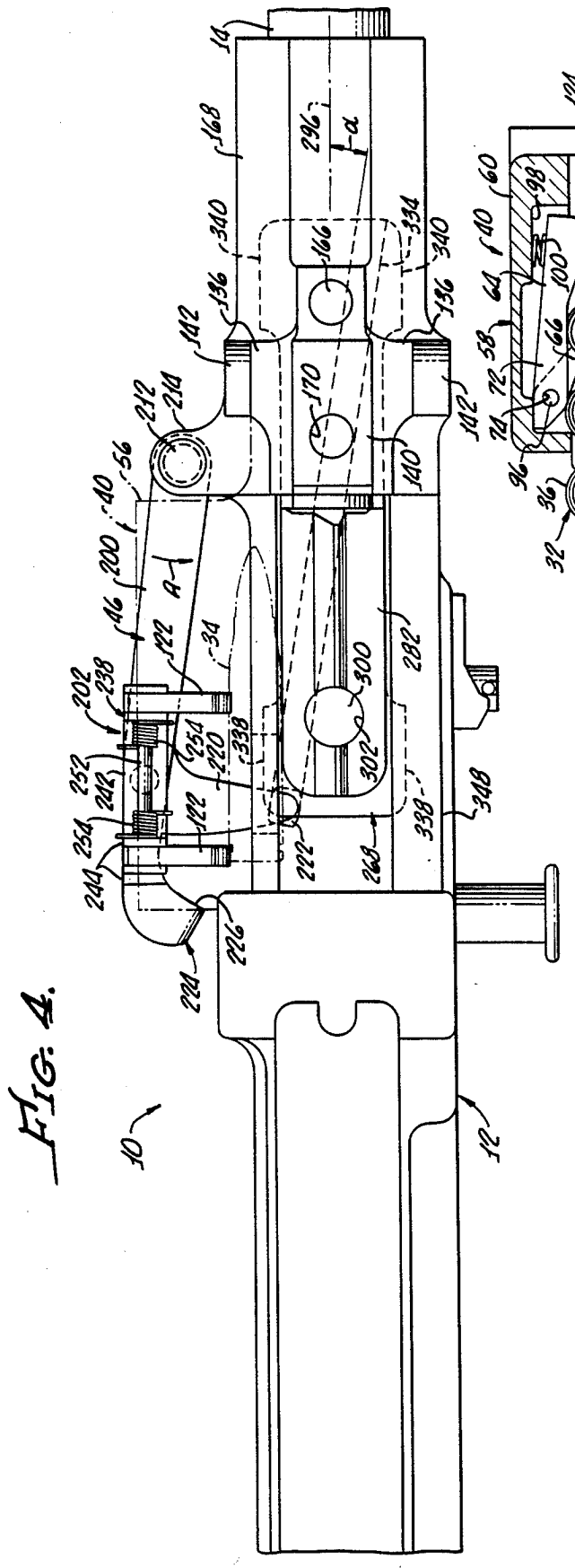


FIG. 4.

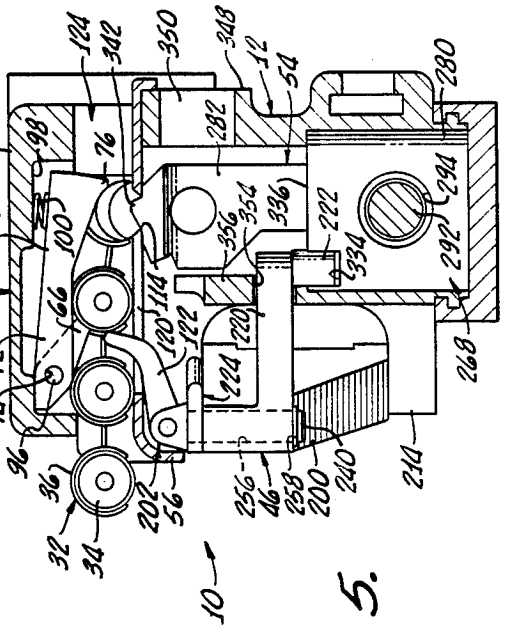


FIG. 5.

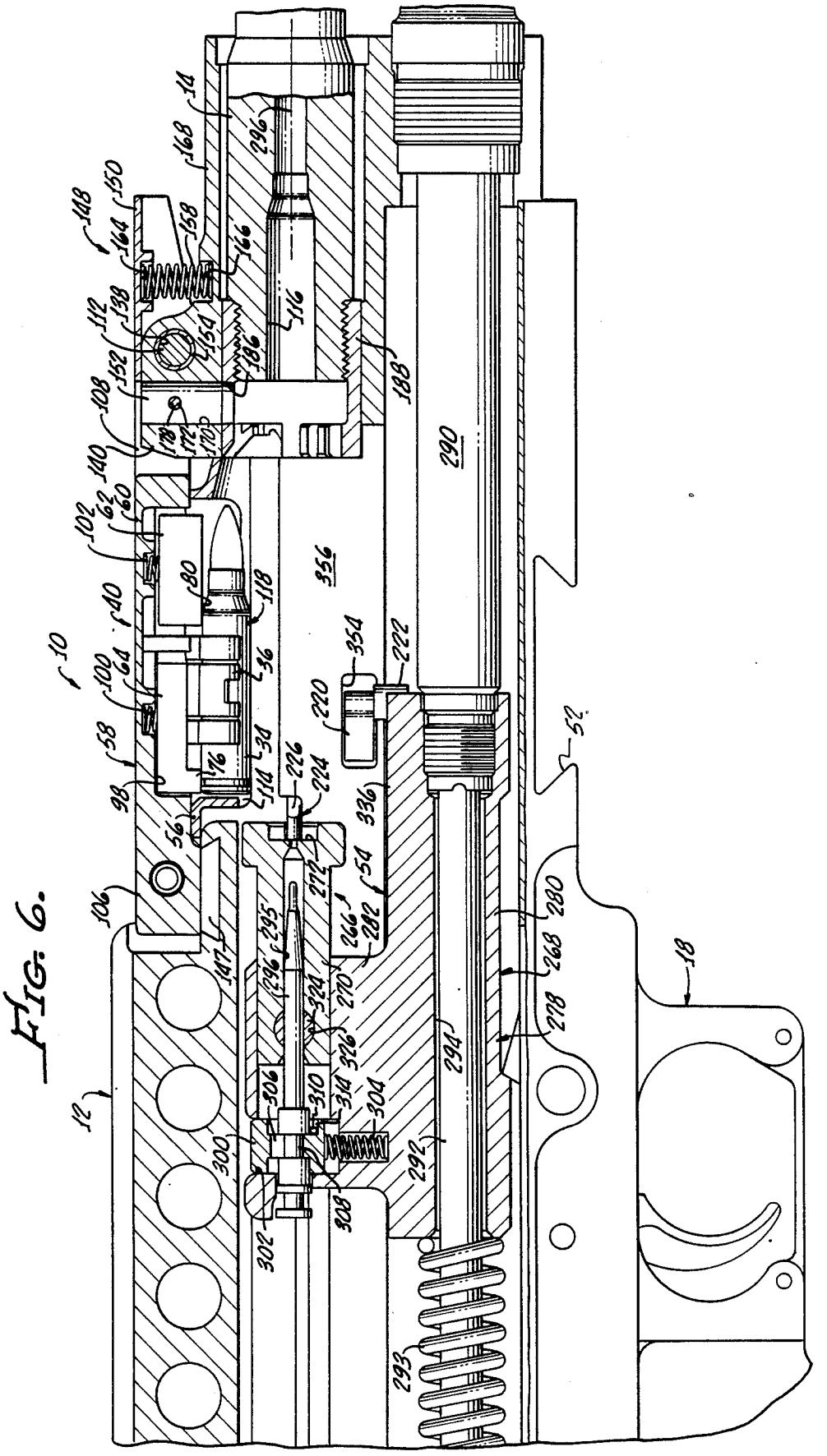

10
12
14
16
18
30
36
40
52
54
56
58
60
62
64
80
92
94
96
98
100
102
104
106
108
110
112
114
116
118
120
122
124
126
128
130
132
134
136
138
140
142
144
146
148
150
152
154
156
158
160
162
164
166
168
170
172
174
176
178
180
182
184
186
188
190
192
194
196
198
200
202
204
206
208
210
212
214
216
218
220
222
224
226
228
230
232
234
236
238
240
242
244
246
248
250
252
254
256
258
260
262
264
266
268
270
272
274
276
278
280
282
284
286
288
290
292
293
294
296
298
300
302
304
306
308
310
312
314
316
318
320
322
324
326
328
330
332
334
336
338
340
342
344
346
348
350
352
354
356

FIG. 6.

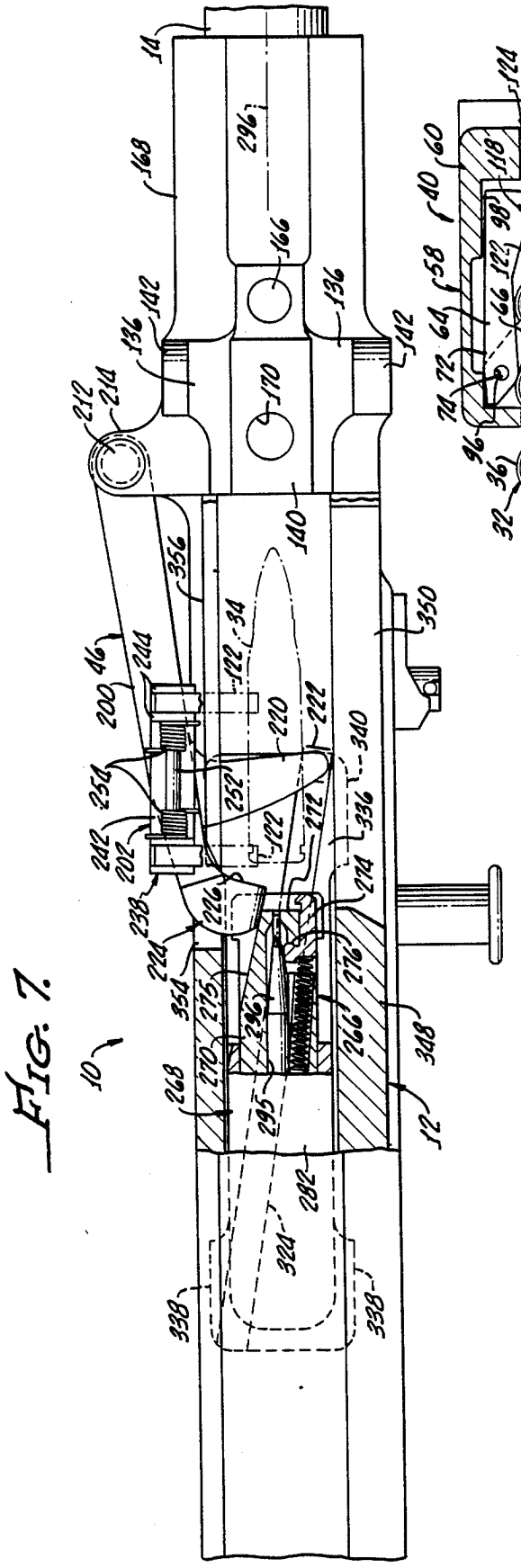


FIG. 7.

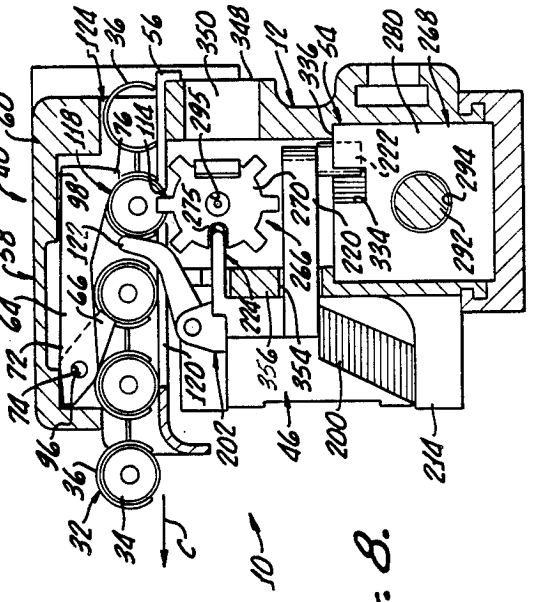


FIG. 8.

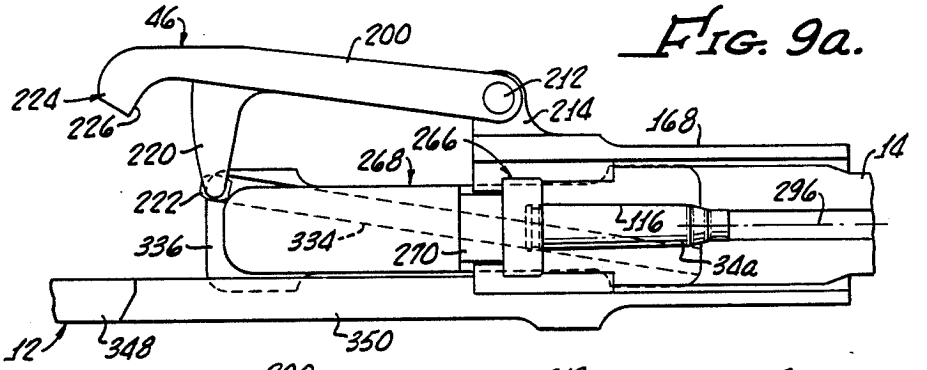


FIG. 9a.

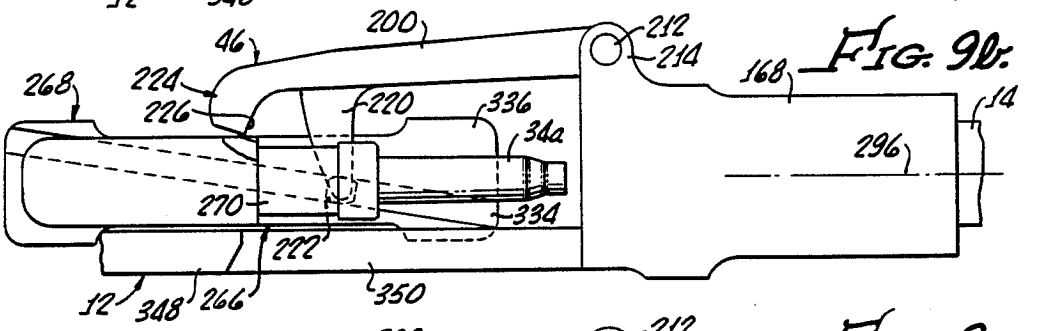


FIG. 9b.

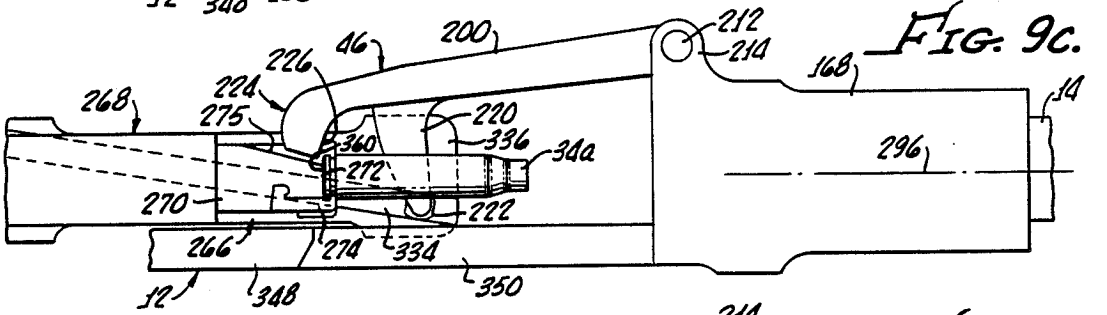


FIG. 9c.

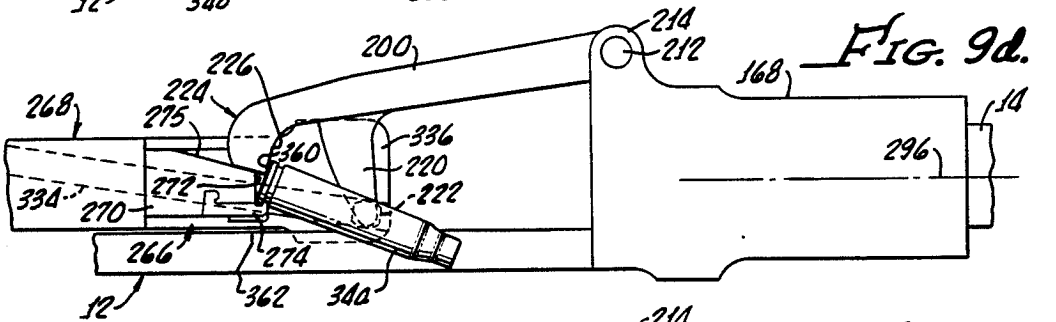


FIG. 9d.

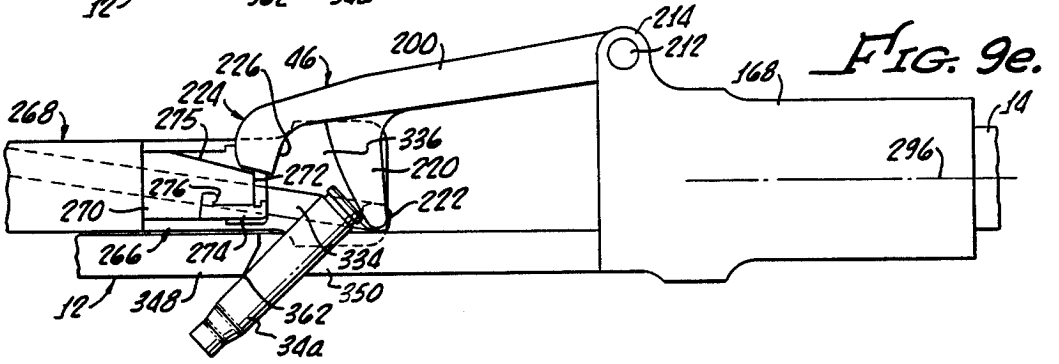


FIG. 9e.

CONVERTIBLE, BELT/CLIP-FED AUTOMATIC GUN WITH POSITIVE SHELL CASING EJECTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to the field of automatic guns and more particularly to light machine guns having the capability for alternatively firing belted and clip-fed ammunition.

2. Background Discussion

In spite of the development of such sophisticated and powerful weapons as nuclear bombs, ballistic and guided missles, supersonic fighters and bombers, super aircraft carriers and nuclear-powered submarines, modern military conflicts still ultimately rely upon foot troops whose combat role is, as it has always been, to take and hold ground. This apparent anomoly has been demonstrated time and time again in post-World War II conflicts, including the Korean war, Viet Nam, Granada and the current Iraq-Iran conflict in the Mid-East.

For several hundred years, the primary weapon of ground troops has been the rifle. Starting with crude, single shot, match-lock muzzle loaders, the rifle has evolved through breech-loaders and semi-automatic rifles, into the present day, relatively small calibre, clip-fed. automatic rifles, exemplified in the United States and many other free countries of the world by the M-16 and in Soviet-block countries by the AK-47.

In most military organizations, rifles have typically been supplemented, on a company, platoon or squad level, by submachine guns (which fire pistol ammunition) and light machine guns (which fire rifle ammunition). By way of example, in both World War II and Korea, the semi-automatic M1 rifle used by U.S. troops was augmented by such automatic weapons as the Thompson submachine gun, the "grease" gun, the Browning automatic rifle (BAR) and 30 and 50 calibre machine guns, and in Viet Nam the M-16 was, for example, augmented by the larger, NATO calibre M-60 machine gun.

Many modern automatic rifles, such as the M-16 and the AK-47, as well as various other similar rifles in service throughout the world, combine features which were once separately found in rifles, submachine guns and light machine guns. The resulting modern rifles, which are usually selectable between semi-automatic and fully automatic firing, are sometimes referred to generically as "assault rifles."

Although modern automatic rifles usually have many advantages over those used in World War II and Korea, being generally lighter in weight and having greatly increased fire power, improvements are still continually sought by the military services not only in automatic rifles but also in ligth machine guns (LMG) which are easily carried by troops and which increase the firepower and effectiveness of the troops in both offensive and defensive situations.

One relatively recent requirement, at least by the military in this country, for new generation LMG's is that such weapons have the dual capability for firing both belted ammunition and ammunition held in conventional, rifle clips. The use of belted ammunition, which is, in one configuration, held in boxes which attach to the gun, enables sustained firing without reloading the gun. On the other hand, the ability to use standard rifle clips which hold the same calibre ammunition and which are commonly available in rifle companies using the LMG's, enables continued operation of the LMG if the supply of belted ammunition is exhausted.

Although some types of belt and clip-fed, "convertible" LMG's have been put into limited service, that does not necessarily mean that such guns are entirely satisfactory for combat use or that they cannot or should not be improved upon. Extensive, individualized "gunsmithing" is, for example, reportedly required on some types of convetable LMG's before they are capable of satisfactory operation even in benign environments. This raises questions as to the reliability of such guns in service and especially under combat conditions, and improvements to overcome this apparent manufacturability problem are expected to be needed.

It is desirable in such convertible guns to reduce the number of small and/or complicated parts. Complicated parts are not only costly to manufacture but often make the interchageability of parts difficult.

Among other requirements, LMG's should: (i) be rugged and operate reliably and accurately, in a wide range of hostile environments, including arid and sandy deserts, humid jungles and icy polar regions, (ii) be capable of taking all manner of abuse and still operate satisfactorily; (iii) not require excessive maintanance and whatever maintenance is required should be quick and simple to perform both under adverse field conditions and by relatively untrained troops, (iv) not have an excessive number of complicated parts which can be easily damaged or which cannot be interchanged among weapons of the same type, (v) be easy to operate accurately by relatively green troops, and (vi) be relatively simple and economical to manufacture.

The importance of this country's having the best possible weapons, including LMG's, for its troops is made evident by the fact that in any armed conflict, United States troops can be expected to be out numbered by enemy troops, often by a large margin. It is, therefore, a principle objective of the present invention to provide an improved, convertible belt/clip-fed automatic gun or LMG which will overcome the deficiencies of known guns of such type.

SUMMARY OF THE INVENTION

In accordance with the present invention, a convertible, belt/clip-fed automatic gun, such as a light machine gun, comprises a barrel having a breech and a receiver connected to the barrel and having a battery position disposed adjacent the barrel breech, a shell pick up position and a shell casing ejection port. A bolt assembly, comprising a bolt and a bolt carrier, is slidably mounted in the receiver for reciprocating movement, in response to firing of the gun, between the battery position and a recoil position rearwardly of the shell pick up position and the shell casing ejection port. The bolt assembly includes means for picking up a shell from the pick up position upon forward bolt assembly movement, for loading the picked up shell into the breach and, after firing, for extracting the fired shell casing and ejecting it outwardly through the ejection port upon rearward recoil movement from the breech towards the recoil position.

Further comprising the gun are ammunition belt receiving and advancing or feeding means which include a cam follower pivotally mounted to the receiver, at least one belt advancing pawl mounted to the cam follower, a belt feeding adapter for receiving an ammuni-

tion belt and means for releasably attaching the belt feeding adapter to the receiver adjacent to the shell pick up position and in an operative relationship with the cam follower. The cam follower has a portion thereof in movable engagement with a cam track formed on the bolt assembly, preferably on the bolt carrier, the cam follower being shaped so that upon rearward movement of the bolt assembly (and thus, the cam track) from the breech to the recoil position, for example, by a firing of the gun, the belt advancing pawl is moved inwardly towards the bore axis to inwardly advance, by one shell position, an ammunition belt held by the belt feeding adapter in a manner moving a shell held in the belt into the shell pick up position. The cam follower is also responsive to forward movement of the bolt assembly from the recoil position to the breech for moving the belt advancing pawl a shell distance outwardly in readiness for advancing the belt the next time the bolt assembly is moved rearwardly to the recoil position.

The bolt assembly includes a shell extractor and an ejector recess in a region opposite the extractor. The cam follower includes a shell ejector portion which is caused by the bolt carrier cam, responsive to the bolt assembly moving rearwardly from the the breech to the recoil position and pivoting of the cam follower, to move into the ejector recess and cause ejection of a shell casing held by the shell extractor as the bolt assembly continues to recoil rearwardly to a preestablished position relative to the shell ejection port.

There is also included as part of the gun an ammunition clip holder and means for releasably attaching the clip holder to the receiver in place of the belt feeding adapter and out of engagement with the belt advancing pawl. The clip holder is preferably constructed to receive and feed shells from a conventional rifle clip and for holding the clip directed upwardly and at an angle relative to a vertical plane through the bore axis which does not interfere with use of the gun sights.

According to a preferred embodiment of the invention, the belt feeding adapter includes at least one shell anti-back up pawl for preventing a shell in the pick up position from being moved outwardly away from said position when the belt advancing pawl is moved outwardly in response to forward movement of the bolt assembly.

It is preferred that the cam follower be pivotally mounted at a forward region to the receiver and that the cam track engaging portion be rearward of the pivotal mounting region. Also, it is preferred that the belt advancing pawl is pivotally mounted to the cam follower and is spring-loaded so that when the cam follower is pivoted outwardly, in response to forward movement of the bolt assembly, the pawl pivots to a retracted position as the pawl is pushed outwardly under a shell in the belt to a position which enables the pawl to advnce the belt one shell position when the cam follower is next pivoted inwardly in response to the bolt assembly moving back rearwardly from the breech.

In the preferred embodiment, the belt feeding adapter comprises a lower, body portion and an upper, cover portion, the body and cover portions being hinged together so that the cover porton can be opened relative to the body portion without detaching the adapter from the receiver, an ammunition belt being insertable in the adapter when the coverportion is open and being retained in the adapter when the cover portion is then closed.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention can be more readily understood from the following detailed description when taken in conjunction with the accompanying drawings. It is to be noted that for purposes of showing important features of the convertible gun of the present invention, the gun is pointing to the left in FIG. **1** and is pointing to the right in the rest of the FIGS. In the accompanying drawings:

FIG. **1** is an exploded perspective of a convertible belt/clip-fed automatic gun (LMG) in accordance with the present invention,

FIG. **1***a* showing the belt feeding configuration of the gun, and

FIG. **1***b* showing the relative portion of the gun alternatively configured for feeding ammunition to the gun from a conventional automatic rifle clip;

FIG. **2** is an exploded perspective drawing of ammunition feeding and casing ejection regions of the convertible gun shown in FIG. **1**, showing the bolt group (i.e., the bolt and bolt carrier), portions of the receiver and barrel and showing both the belt feeding adapter and the rifle clip feeding adapter;

FIG. **3** is a longitudinal cross sectional view taken along line **3—3** of FIG. **2** (assuming the parts shown in exploded perspective in FIG. **2** are assembled together in their proper relationship), showing the gun at an instant in time in which the bolt group is at the breech with a shell in the breech and showing the belt feeding adapter installed on the receiver;

FIG. **4** is a plan view taken along line **4—4** of FIG. **3**, but with the belt feeding adapter removed, showing the outwardly pivoted position of a belt feeding cam follower mounted on the receiver at the same instant in time as FIG. **3**, with the bolt group still at the breech;

FIG. **5** is a transverse cross sectional drawing taken along line **5—5** of FIG. **3** showing, in particular, a belt advancing feed pawl (connected to the belt feeding cam follower) in an outermost position in readiness for advancing a next shell in the belt to the shell pick up position when the bolt group moves rearwardly in recoil after firing the shell chambered in the breech;

FIG. **6** is a longitudinal cross sectional drawing similar to the view of FIG. **3**, but showing the internal configuration of the receiver region of the gun at a later instant in time when the bolt group has recoiler fully rearward after firing the shell previously chambered in the breech;

FIG. **7** is a plan view of the gun similar to FIG. **4**, but showing the inwardly pivoted position of the belt feeding cam follower at the instant of time of FIG. **6** when the bolt group has recoiler to a rearward position;

FIG. **8** is a transverse cross sectional drawing similar to FIG. **5** but at the instant of time of FIG. **6** when the bolt group has recoiled to a rearward position, and showing the belt advancing pawl in its innermost position in which it has just moved a belted shell into the pick up position in readiness to be picked up by the bolt when the bolt group moves back forwardly to the breech; and

FIG. **9** is a sequence of plan views similar to FIG. **4** and taken at succesive time intervals, showing the belt feeding cam follower and the bolt as the bolt moves rearwardly from the breech, after firing, to its full recoil position and showing the extraction and ejection of a fired shell casing by the bolt,

FIG. 9*a* showing the bolt at the breech, a chambered shell and the belt feeding cam follower pivoted to its outermost position,

FIG. 9*b* showing the bolt moved slightly rearwardly after firing, thereby starting the extraction of the fired shell casing from the breech and showing the belt feeding cam follower being pivoted inwardly towards a barrel bore axis,

FIG. 9*c* showing the bolt recoiled rearwardly with the shell casing extracted from the breech and laterally aligned with a shell ejection port of the receiver and showing the belt advancing cam follower pivoted inwardly towards the bore axis so that a shell ejecting portion of the cam follower has entered a shell ejection recess in the bolt and is in contact with the base of the shell casing being extracted,

FIG. 9*d* showing the bolt moved rearwardly relative to the belt feeding cam follower so that the shell ejection portion of the cam follower is forwardly of the bolt and has pushed against the shell casing base so that the casing is pivoting about the shell extractor and is part way out of the ejection port, and

FIG. 9*e* showing the bolt recoiled further rearwardly of the belt feeding cam follower and showing the extracted shell casing pivoting out of the ejection port and in contact with a rearward edge of the port which acts as a pivot point.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Illustrated in FIG. 1*a* is an examplary light machine gun (LMG) **10** in which the present invention may be used to advantage. Shown comprising gun **10** is a receiver **12** to which a barrrel **14** is connected. A collapsible shoulder member or stock **16** projects rearwardly from receiver **12** and a conventional pistol grip-type handle and trigger group **18** are connected to lower, rear regions of the receiver. A bipod assembly **20**, for example, of the type used on an M-60 machine gun, is connected to rearward regions of barrel **14**. Just rearwardly of bipod assembly **20** is a hand guard-grip assembly **22** which encloses rearward regions of barrel **14** and/or forward regions of receiver **12**.

Detachable connected to the bottom of receiver **12**, forwardly of handle and trigger group **17**, is a box magazine **30** which holds a flexible belt **32** of ammunition (i.e., shells) **34** for gun **10**. Ammunition belt **32** is of the disintegrating link type in which adjacent links **36** are interlocked by shells **34**, the stripping of shells causing the links to separate so they can be separately discharged from gun **10**, as described below.

In accordance with the present invention, and as described below, an ammunition belt adapter assembly **40** is detachably connected to the lefthand side (as shown in FIG. **1**) of receiver **12** for enabling the firing by gun **10** of shells **34** from belt **32**. Shown in operative relationship with belt adapter assembly **40** is a cam follower assembly **46** which provides not only for the advancing of ammunition belt **32** into gun **10**, so that shells **34** held by the belt can be fired, but also for the ejection of fired shell casings through the other side of receiver **12**, as described below.

Although gun **10** is, as a light machine gun, primarily intented for firing belted ammunition, as is enabled by belt adapter assembly **40** and cam follower assembly **46**, emergency situations may arise during combat in which supplies of belted ammunition for the gun may run out. In order to enable continued operation of gun **10** in such situations, albeit with reduced fire power, there is included the provision for alternatively using standard rifle ammunition clips which may, in some situations, be more plentiful than belted ammunition. Accordingly, as depicted in FIG. 1*b*, which shows only shell feeding regions of gun **10**, ammunition belt adapter **40** may be substituted, also as more particularly described below, by a clip feeding adapter assembly **48** which then permits the firing by the gun of shells held in a conventional rifle clip or magazine **50**. By way of example, assuming that gun **10** is configured for firing standard 5.56 mm (i.e., 223 calibre) ammunition which is used in the M-16 rifle, clip adapter assembly **48** is preferably configured for receiving a standard M-16 clip **50**. As can be seen from FIG. 1*b*, when belt adapter **40** is replaced by clip adapter **48**, box magazine **30** is removed from a dovetail slot **52** in receiver **12**. Also, parts of cam follower assembly **46** are, as described below, removed to accomodate clip feeding adapter assembly **50**.

FIG. **2** shows, in exploded perspective, relevant shell feeding and ejecting regions of gun **10** to which belt and clip adapter assemblies **40** and **48**, respectively, are detachably connected. Shown in FIG. **2**, in addition to forward regions of receiver **12** and rearward regions of barrel **14**, are belt adapter assembly **40**, clip adapter assembly **48**, cam follower assembly **46** and a bolt group **54**.

It is to be noted that in FIG. **2** and subsequent FIGS. gun **10** is pointing to the right; whereas, in order to show features not otherwise clearly visible, FIGS. 1*a* and 1*b* depict the gun pointing to the left.

Principally comprising ammunition belt adaptor assembly **40**, as shown in FIG. **2**, are an adaptor base **56** and a cover assembly **58**. In turn comprising cover assembly **58** are a upwardly recessed cover plate **60**, a shell stripper **62**, a shell pusher **64** and a shell holding or anti-back up pawl **66**. Shell pusher **64** is formed having a pair of similar, longitudinally spaced apart, outwardly directed ears **72** through which are formed a pair of longitudinally aligned mounting apertures **74**. Formed along the rearward edge of shell pusher **64** is a downwardly projecting, wedge-shaped shell pushing portion **76**. Shell stripper **62** is generally square in plan view and has a mounting aperture **78** formed longitudinally through an outer end region thereof. Formed upwardly into shell stripper **62**, at a inner, rearwardly corner of the stripper is a recess **80** which receives forward regions of belt links **36** when a shell **34** is being stripped out of ammunition belt **32** during firing of gun **10** and holds the link in place (i.e., prevents forward movement of the link as the shell is pushed forwardly during the stripping operation). Anti-back up pawl **66** is formed having a pair of outwardly projecting, longitudinally spaced apart, parallel ears **82** interconnected at inner end by a pawl portion **84**. A pair of longitudinally aligned mounting apertures **86** are formed through outer end regions of ears **82**. Upon assembly, anti-back up pawl **66** is positioned between shell pusher ears **72** with mounting apertures **86** and **74** aligned, and with a coil-type torsion spring between pawl ears **82**.

An elongate pin **96**, extends longitudinally through apertures (not shown) in cover plate **60** and through shell pusher apertures **74**, pawl apertures **86**, spring **94** and stripper apertures **78**. Pin **96** pivotly mounts shell pusher **64** and stripper **62** in a side-by-side relationship, with the stripper forwardly of the pusher and with anti-back up pawl **66** between pusher ears **72**, within a rectangular recess formed upwardly into cover plate **60**

and defined by an under surface **98** (FIGS. **3** and **5**). Compression springs **100** and **102**, installed between inner end regions of shell pusher **64** and shell stripper **62**, respectively, and cover plate under surface **98**, when the shell holder and stipper are installed on pin **96**, urge inner end regions of the pusher and stripper downwardly. Such downward pivoting is limited by the upper surfaces of outer ends of shell pusher **64** and stripper **62** bearing against cover under surface **98**.

Further comprising cover assembly **58** (still referring to FIG. **2**) are two opposing, spring loaded cover latches **104** which project sidewardly in opposite directions from a rearward end region **106** of cover **60**. Latches **104** are retained in end region **106** by a pair of vertical pins **107**. Projecting forwardly from cover **60**, and forming part thereof, are a two similar, laterally spaced apart arms **108**, by means of which the cover assembly is attached to receiver **12**. A pair of laterally aligned attaching apertures **110** are formed through forward end regions of arms **108** for receiving a removable mounting pin **112**, as described below.

Ammunition belt adapter base **56** is configured to mate with cover assembly **58**, described above, so that ammunition belt **32** (FIG. **1***a*) cam be fed therebetween from magazine **30** into gun **10**. A recessed bottom region of base **56** is formed having a longitudinal shell feeding slot **114** which is narrower in rearward regions than in forward regions, the forward regions being sufficiently wide to permit a shell **34** being stripped forwardly from ammunition belt **32** to move downwardly through the slot and into a shell chamber **116** (FIG. **3**) formed in the barrel **14** at the breech. Rearward regions of feeding slot **114** are narrower than a shell width so that shells **34** moved into a shell pick up position **118** (FIG. **6**, **8**) at the slot are supported by adapter base regions on both sides of the slot. Two longitudinally spaced apart, lateral slots **120** (only a forward one of which is shown in FIG. **2**) are formed in the botton of base **56**, from shell feed slot **114** outwardly, to provide cleareance for a pair of belt advancing pawls **122**, which, as described below, comprise part of cam follower assembly **36**.

A rectangular, belt link ejection port **124** is defined in an inboard side edge **126** of base **56** to enable the discharge of belt links **36** after a shell **34** has been stripped from the link which is at feed slot **114**. Projecting forwardly from adapter base **56** and forming a part thereof are two laterally spaced apart mounting arms **126** having mounting apertures **128** formed therein for receiving mounting pin **112**. Upon attachment of belt feeding adapter **40** to receiver **12**, arms **108** of cover **60** fit inside of arms **126** of base **56** and such arms slide downwadly into slots **136** in upper forward regions of the receiver until the apertures **110** and **128** in respective arms **108** and **126** are aligned with a mating transverse aperture **138** formed through a receiver boss **140** and side ears **142** defined by slots **136**. Pin **112** is then inserted laterally through apertures **130**, **128** and **110**, the pin being thereafter locked in place, as by the use of a detent pin **144** having a spring **146**. When pin **112** is removed cover assembly **58** and base **56** can be removed as two pieces. When adapter base **56** and cover assembly **58** are pivoted closed on pin **112**, latches **104** on cover **60** snap into a latching member **147** mounted on receiver **12** (FIG. **2**).

As shown in FIGS. **2** and **3**, a barrel lock assembly **148** may advantageously also be installed on pin **112**. Comprising barrel lock assembly are an operating lever **150**, a barrel locking pin **152** a tubular bushing **154** and concentric compression springs **156** and **158**. Lever **150** is formed having two, laterally spaced apart, depending legs **160**, each of which has a mounting aperture **162** formed therethrough. When lock assembly **148** is attached to receiver **12**, legs **160** straddle boss **140** and extend downwardly into slots **136** on either side of the boss. Bushing **154** is inserted, through an outer aperture **138** in righthand side ear **142**, into the corresponding aperture in boss **140** and through lever leg apertures **162**.

In the above-described manner, lever **150** is locked to boss **140** and can pivot on bushing **154** which has clearance relative to the boss aperture. Upper ends of compression springs **156** and **158** are received into a shallow pocket **164** (FIG. **3**) formed on the under side of lever **150** forwardly of mounting pin **112**. Lower ends of springs **156** and **158** are received in a shallow recess **166** formed into a forward end region **168** of receiver **12**. Barrel locking pin **152** is installed in a vertical aperture **170** formed downwarly through boss **140**. Locking pin is fixed to lever legs **160** by a transverse pin **172** which extends through apertures **174** in legs **160** rearwardly of apertures **162**, through a vertically elongated slot **176**, which extends transversely through boss **140** in the region of aperture **170**, and through a transverse aperture **178** through locking pin **152**. When so installed, springs **156** and **158** urge the lower end of locking pin **152** into an aperture **186** (FIG. **3**) in a tubular bolt locking ring **188** threaded onto the reaward end of barrel **14**, assuming, of course, that the barrel and locking ring are porperly oriented relative to the locking pin.

When barrel locking assembly **148** is installed in the above described manner, a bushing **190** (FIG. **2**) is installed in the side ear aperture **138** through which bushing **154** is installed so that pin **112** fits properly.

Cam follower assembly **46** (FIG. **2**) principally comprises a cam follower member **200** and a belt (shell) advancing pawl assembly **202**. Cam follower member **200** is formed having upper and lower mounting ears **204** and **206**, respectively, at the forward end. Mounting apertures **208** and **210** are formed, in vertical alignment, through respective mounting ears **204** and **206** for receiving a mounting pivot pin **212**. A pair of mating mounting lugs **214** project outwardly from the lefthand side of receiver **12** rearwardly adjacent to receiver side ears **142** (FIGS. **4** and **5**) between which upper and lower ears **204** and **206**, respectively, of cam follower member **200** fit and through which adapter mounting pin **112** is also installed to thereby pivotally attach cam follower assembly **46** to receiver **12**. A coil torsion spring **216** installed on pin **112** between cam follower member ears **204** and **206** urges the member to pivot about the pin in an inward direction (in the direction of arrow "A", FIG. **4**).

Projecting inwardly from a reawardly end region of cam follower member **200** is a cam follower arm **220** (FIGS. **2**, **4** and **5**). Pivotally mounted to the inboard, distal end of cam follower arm **220** is a depending cam follower element **222**. A reaward end of cam follower member is curverd inwardly to form a shell casing ejector **224** having a flat, forwardly directed, casing ejector face **226** (FIG. **4**).

Comprising belt advancing pawl assembly **202** (FIGS. **2**, **4** and **5**) is a T-shaped member **238** comprising a depending pivot pin **240** and an elongate arm **242** fixed to the top thereof. Two pairs of pawl mounting ears **244** project upwardly from the top of arm **242**, one pair of

ears being at each end of the arm in a longitudinally spaced apart relationship. Pawl mounting apertures **246** are formed in ears **244** and correspondig apertures **248** are formed through the outboard end of each pawl **122**. With both pawls **122** pointing inardly (FIG. **5**) and one pawl inserted between each pair of ears **244**, the pawls are pivotally mounted to member **238** by a mounting pin **252** which extends rearwardly through all of apertures **246** and **248** and is retained in place by a detent (not shown). Torsion coil springs mounted on pin **252**, between pawls **122**, urge inboard ends of the pawls upwardly (FIG. **5**). Lower surface regions of pawls **122** beneath mounting pin **252** bear against an upper surface of arm **242** and limit pivotal movement of the pawls.

Pivot pin **240** connects pawl assembly **202** to cam follower member **200**, the pin being downwardly received through an aperture **256** formed vertically through the member about $\frac{2}{3}$ of the distance rearwardly from member mounting pin **212** toward the ejector tip **224**. A conventional C-ring **258** (FIG. **2**) may be used to retain pivot pin **240** in cam follower member **200**. When pawls **122** are installed in the above described manner, they curve upwardly and inwardly (FIG. **5**) so as to bear against a shell **34** in ammunition belt **32**.

Bolt group **54** (FIG. **2**) comprises generally a bolt assembly **266** and a bolt carrier assembly **268**. Bolt assembly **266** is mounted to bolt carrier assembly **268** in a generally conventional manner so that limited axial movement between them is permitted. In turn comprising bolt assembly is a bolt **270** having a forward face **272** (FIGS. **2** and **3**) and a spring-loaded, shell casing extractor **274** mounted by a semi-cylindrical pivot ridge **276** engaging a mating semi-cylindrical groove within recess **275** adjacent such forward face (FIGS. **7** and **9**). An ejection recess **275** is cut into bolt **270** opposite to casing extractor **274**.

Bolt carrier assembly **268** comprises a generally L-shaped carrier **278** having an elongate lower portion **280** and a shorter upper portion **282**. Connected to a forward end region of carrier lower portion **280** is a forwardly directed, gas operated push rod. A rearwardly directed, elongate recoil rod **292** extends through a longitudinal aperture **294** in carrier lower portion **280** in axial alignment with push rod **290**. Mounted around recoil rod **290**, rearwardly of carrier **268**, is a long recoil spring **293**.

Longitudinally mounted in an aperture **295** formed axially through carrier upper portion **282** along a barrel bore axis **296** (FIGS. **2** and **3**) is an elongate firing pin **298** which is held in aperture **295** by an I-shaped locking element **300** which is installed downwardly into a circular aperture **302** in carrier upper portion **282** on top of a compression spring **304**. When locking element **300** is pushed downwardly against spring **304**, firing pin **296** is inserted through an aligned aperture **306** in the element. Then, when element **300** is released, spring **304** pushes the element upwardly so that portions of the element adjacent aperture **306** engage a groove **308** around rearward regions of the firing pin, thereby locking the firing pin in carrier upper portion **282**. Although locking element **300** is thereby held in aperture **302** by firing pin **296**, if the firing pin has to be repolaced, the element will be loose unless otherwise retained. For such retaining purpose, a slender, transverse pin **310** is installed in a transverse aperture **312** formed through carrier upper portion **282** in the region of locking pin aperture **306**. When inserted in aperture **312**, pin **310** is received in a recess **314** in a forward side of locking element **300**. As a result, firing pin **296** can be removed without removing locking pin **312**. Forward regions of firing pin **296** are received into a bore axis aperture formed through bolt **270** when bolt assembly **266** and carrier assembly **268** are assembled together.

Bolt assembly **266** is connected to carrier assembly **268** by a transverse camming pin **324** which is received in a recess **326** in bolt **270** and which extends into a flat L-shaped camming aperture formed through the inboard side of carrier upper portion **282**. Camming pin **324** and camming aperture **328** permit limited axial movement of bolt assembly **266** relative to carrier assembly **268** and permit the bolt assembly to rotate a partial turn so that the bolt assembly can be locked to a breech locking ring **188** (FIG. **2**) when the bolt and carrier assemblies are driven forwardly, by recoil spring **293**, into their forwardmost, battery position.

Importantly, as shown in FIGS. **2**, **4**, **5**, **7** and **8**, a substantially linear cam track **334** is formed downwardly into carrier lower portion **280** from an upper surface **336** thereof. Cam track **334** is angled outwardly and rearwardly at an angle, α, with respect to barrel bore axis **296** (FIG. **4**). Preferably angle, α, is between about 5° and about 10°, and is more preferably about 6°. The depth and width of cam track **334** are selected so that cam track follower element **222** slides freely along the track (FIG. **5**).

Bolt group **54** is installed in receiver **12** for axial sliding movement between a forwardmost battery position (FIG. **3**) and a rearward, recoil position (FIG. **6**). This rearward, recoil position of bolt group **54** may, however, vary depending upon many factors including characteristics of the ammumition fired (which determine recoil forces), temperature of gun **10**, amount of wear of the moving parts of the gun, and the amount of lubrication and dirt present in the gun. Guides, such as guides **338**, **340** and **342** (FIG. **2**) on bolt carrier assembly **268** and mating, longitudinal guideways (not shown) along the inside of receiver **12** guide the reciprocating movement of bolt group **54** in the receiver.

Formed through a righthand side wall **348** of receiver **12**, opposite cam follower member **200** (FIGS. **2** and **5**) is an axially elongate shell casing ejection port **350**. Below and rearwardly of ejection port **350** is an axially elongate charger slot **352** through which, upon assembly of gun **10**, a charging lever (not shown) outwardly projects. An axially elongated cam follower slot **354** is formed in a lefthand side wall **356** of receiver **12** to enable the insertion of cam follower arm **220** though such side wall and into engagement with bolt carrier cam track **334**. Furthermore, receiver **12** is open at the top in the region of belt feeding adapter assembly **40** (FIG. **2**).

ASSEMBLY

The assembly of gun **10** for firing shells **34** from ammunition belt **32** is generally apparent from the above description. By way of brief summary, however, bolt group **54** is installed in receiver **12** and barrel **14** is inserted in receiver forward region **168** (FIGS. **2** and **3**). Barrel lock assembly **148** is assembled as described above and is pivotally mounted to receiver boss **140** by bushing **154** (FIGS. **2** and **3**). Barrel **14** is then locked to receiver **12** by locking pin **152**.

Cam follower assembly **46**, with cam follower arm **220** inserted inwardly through cam follower slot **354** (FIG. **5**) in receiver side wall **356** and with cam follower element **222** in bolt carrier cam track **334**, is piv-

otally mounted to receiver lugs **214** by pin **212** (FIG. **2**). Belt feeding adapter cover assembly **60** is also assembled as described above with respect to FIG. **2** and, together with adapter base **56**, is pivotally mounted, by pin **112**, to receiver boss **140** and side ears **142** (straddling barrel lock assembly **148**). Cover assembly **60** is then opened relative to base plate **56** and one end of an ammunition belt **32** is inserted between the cover assembly and base, with an end shell **34** at base slot **114** (i.e., at shell pick up position **118**). Cover assembly **60** is then closed so that latches **104** snap into member **147** on receiver **12**.

OPERATION

FIGS. **3–5** are different views of gun **10** showing the condition of the gun at the instant of firing, with both bolt assembly **266** and bolt carrier assembly **268** in a forwardmost, battery position and with cam follower assembly **46** pivoted to its outermost position, feed pawls **122** being thereby positioned relative to ammunition belt **32** for advancing the belt when the cam follower assembly is pivoted inwardly. In contrast, FIGS. **6–8**, which correspond to respective FIGS. **3–5**, show the condition of the gun at the instant of full rearward recoil of bolt assembly **266** and carrier assembly **268** (after firing of the gun or upon charging the gun), with cam follower assembly **46** pivoted to its inwardmost position and with feed pawls **122** having advanced a shell **34** held in ammunition belt **32** into shell pick up position **118**.

As more particularly described below, FIG. **9** is a series of simplified diagrams which correspond to time lapse photographs, depicting, in simplified form, the positive shell casing ejection operation of gun **10**. FIG. **9*a*** starts at the instant in time corresponding to FIGS. **3–5** when bolt and carrier assemblies **266** and **268** are fully forward for firing a chambered shell **34** and cam follower member **200** is pivoted fully outward. FIG. **9*e*** ends at the later instant in time corresponding to FIGS. **6–8** when the bolt and carrier assemblies are fully rearward in recoil and the cam follower member is pivoted fully inwardly, causing ejection of a casing **34*a*** (of shell **34**) outwardly through ejection port **350** as a result of ejector tip **224** of cam follower member entering through ejector recess **275** in bolt **270** and engaging a base **360** of the casing, the casing pivoting about a rearward edge **362** of ejection port **350** and out through the port. FIGS. **9*b*–9*d*** depict the shell casing ejection operation at times intermediate those depicted by FIGS. **9*a*** and **9*e***.

More specifically, at the instant of firing depicted in FIGS. **3–5** and **9*a***, barrel gas is bled from barrel **14** and may be directed in a conventional manner to a forward face (not shown) of gas piston **290** which is connected to bolt carrier assembly **268**. The gas acting on piston **290** starts recoiling carrier assembly **268** rearwardly, thereby causing, by action of camming pin **324** and slot **328**, the rotational unlocking of bolt assembly **266** locking ring **188** (FIG. **3**). As cam followen element **222** in engagement with bolt carrier cam track **334**, rearward recoil movement of carrier assembly **268** causes cam follower assembly **46** to pivot inwardly about pin **212** (direction of arrow "A," FIG. **4**). This inward pivoting of cam follower assembly **46** moves shell advancing pawls inwardly towards barrel bore axis **296** (direction of arrow "B," FIG. **5**). Continued rearward recoil movement of carrier assembly **268** pulls bolt assembly **266** along in recoil and causes cam follower assembly **46** to continue pivoting inwardly, therby causing pawls **122** to continue the advancing of an endmost shell **34** inwardly towards pickup position **118**.

As bolt carrier assembly **268** recoils, recoil spring **293** (FIGS. **2**, **3** and **6**) is compressed, thereby absorbing recoil energy from bolt group **54** and bringing the bolt group to a stop at a rearmost position when all the recoil energy has been absorbed. In this bolt group rearmost position, depicted in FIGS. **6–8**, cam track **334** on bolt carrier **278** has caused cam follower assembly **46** to pivot fully inwardly and has thereby caused belt advancing pawls **122** to inwardly push a shell **34** in belt **32** into pick up position **118** in readiness to be picked up by bolt **270** as bolt group **54** is driven back forwardly in counterrecoil by spring **293**.

It can be understood from the foregoing operational description that the complete belt/shell advancing step is performed on the recoil stroke of bolt group **54**, unlike some known automatic guns which require some counterrecoil movement of the bolt before the shell advancing step is completed. As a result, according to the present invention, it is assured that a shell **34** is waiting in pick up position **118** when bolt assembly **266** starts forwardly and the possibility that the bolt will counterrecoil to the breech without a shell having been picked up is eliminated.

After bolt assembly **266** has engaged a shell **34** in pick up position **118**, continued counterrecoil of the bolt assembly strips the shell out of its belt link **36** and pushes the shell forwardly and downwardly through feed slot **114**. Shell pusher portion **76** pushed downwardly on base end regions of shell **34** in pick up position **118**, thereby preventing the shell from being underridden by bolt assembly **266** instead of being picked up thereby. As shell **34** is driven forwardly by bolt assembly **266** after pickup, shell pusher **64** urges the shell downwardly through feed slot **114**.

After a shell **34** in pick up position **118** has been stripped out of belt **32**, the loose link **36** is pushed out of link ejection portion **124** the next time the belt is advanced by pawls **122**.

As bolt group **54** counterrecoils forwardly, carrier cam track **334** causes cam follower assembly **46** to pivot outwardly about pin **112**, thereby moving belt advancing pawls **122** outwardly (direction of arrow "C," FIG. **8**) so that belt **32** can be advanced another shell position when the bolt group next recoils. As belt advancing pawls **122** move outwardly in response to bolt group counterrecoil movement, the pawls retract as then move past (under) the shell **34** that they will push inwardly against in the belt advancing step. Anti-back up pawls **66** (FIGS. **2**, **5** and **8**) push inwardly on this same shell to prevent the outward movement of belt advancing pawls **122** from backing up ammunition belt **32**.

When bolt assembly **266** reaches the breech, carrier assembly **268** still has a short forward distance to travel. Such continued forward movement of bolt carrier assembly **268** first cams bolt assembly **266** through a partial rotation so that the bolt assembly is locked to breech ring **188** (FIG. **8**) and then fires the chambered shell by inpacting it with the forward tip of firing pin **296**.

As depicted in FIG. **9**, recoil movement of bolt carrier assembly **268** after firing also causes the contolled or positive ejection of fired shell casing **34*a*** outwardly through casing ejection port **350** in a consistant and reliable manner from firing to firing. In this regard, it has been found that using conventional bolt mounted, spring-loaded ejectors, casing ejection is often erratic

and dependent upon bolt recoil velocity which changes as a gun heats up. For example, when firing is initiated and the gun is cold, the firing rate tends to be slow and recoil velocity is relatively low. In this condition, casing ejection tends to be slow and the casing being ejected (with the extractor as a hinge point) tends to "wrap around" the rearward edge of the ejection port, with the center of gravity outside the port, and be ejected backwardly towards the gun operator. However, as the gun get hot and speeds up, the casing being ejected tends to hit the rearward edge of the ejection port with the center of gravity inside the port. When this occurs, the casing can spin back into the gun the cause jamming of the gun. However, with the present configuration of gun **10**, casing ejection by cam follower member tip **224** tends to be independent of gun operating speed.

As shown in FIGS. *9a–9c*, as cam track **334** moves rearwardly (i.e., as carrier assembly **268** recoils after firing), cam follower member **200** (part of cam follower assembly **46**) pivots inwardly, as described above, moving ejection tip inwardly towards bore axis **296** and bolt **270**. Casing **34***a* is extracted and held to the bolt face by bolt-mounted extractor **274**. At a preestablished bolt recoil position (FIG. *9c*) cam follower member **220** has pivoted inwardly to an extent that ejector tip **224** starts entering ejecting recess **275** at the forward end of bolt **270** opposite extractor **274**. As bolt **270** continues recoiling (FIG. *9d*), the bolt moves rearwardly of ejection tip **224**, with the result that the ejection tip "pushes" the contacted edge region of the casing forwardly (relative to the bolt), causing casing **34***a* to start pivoting outwardly through ejection port **350**. Additional recoil movement of bolt **270** (FIG. *9e*) causes ejection tip **224** to pivot casing **34***a* further out of ejection port **350**, the casing being finally released by casing extractor **274** for complete ejection.

Because casing ejection always occurs at the same relative position between bolt **270** and cam follower ejection tip **224**, casing ejection is substantially independent of bolt speed and consistant, complete casing ejection is achieved.

CLIP FEEDING OF GUN 10

Ammunition feeding of gun **10** can, as mentioned above and as shown in FIG. *1a*, alternatively be by means of clip adapter assembly **48** which is configured to hold a conventional rifle clip **50**, for example, an M-16 rifle clip. Comprising clip adapter assembly **48** is a tubular member **370** having a rectangular cross section sized to receive clip **50**. Installed in a rearwardly projecting region of member is a conventional clip release assembly **372** of the type ordinarily used with clip **50**—for example, an M-16 clip release assembly. Projecting forwardly form member **370** are two parallel, spaced apart attachment arms **374** (FIG. 2), which corresponds to arms **108** of cover assembly **58**. Mounting apertures **376**, corresponding to cover assembly apertures **110**, are formed through arms **374** for receiving mounting pin **112**. Extending sidewardly form rearward regions of member **370** are opposing, spring-loaded latch members **378** which correspond to latch members **104** of cover assembly **58**.

To install clip adapter assembly **48** to gun **10**, assuming belt feeding adapter assembly **40** is already installed on the gun, the belt feeding adapter is detached by releasing latches **104** removing mounting pin **112**. Pawl assembly **202** is then removed from cam follower assembly **46** by removing C-ring **258** from pin **240**. Clip adapter arms **374** are then inserted in slots **136** and pin **112** is replaced. Clip adapter assembly **48** is then pressed down so that latches engage latch member **147** on receiver **12**. A loaded clip **50** is then snapped into member **370**.

Thereafter operation of gun with clip feeding is the same as described above for belt feeding, except that sheels are picked up directly from feedlips on clip **50** instead of from ammunition belt **32**. Shell pick up position **118** is, however, the same in both cases.

Although there is described above a specific arrangement of a convertible belt/clip-fed automatic gun, with positive shell casing ejection, in accordance with the present invention for the purpose of illustrating the manner in which the invention can be used to advantage, it is to be appreciated that the invention is not limited thereto. Accordingly, any and all variations and modifications which may occur to those skilled in the art are to be considered to be within the scope and spirit of the invention as defined by the appended claims.

What is claimed is:

1. A convertible, belt/clip-fed automatic gun, which comprises:

a. a gun barrel having a breech;

b. a receiver connected to the barrel and having a battery position disposed adjacent said barrel breech, a shell pick up position and a shell casing ejection port;

c. a bolt assembly slidably mounted in the receiver for reciprocating movement, in response to firing of the gun, between the battery position and a recoil position rearwardly of the shell pick up position and the shell casing ejection port, the bolt assembly having means for picking up a shell from the pick up position upon forward bolt assembly movement and for loading the picked up shell into the barrel breech and, after firing, for extracting a fired shell casing from the barrel breech upon rearward recoil movement from the battery position to the recoil position, said bolt assembly having an ammunition belt advancing and shell casing ejection cam track formed thereon;

d. ammunition belt receiving and advancing means, comprising a cam follower pivotally mounted to the receiver, at least one belt advancing pawl mounted to the cam follower, a belt feeding adapter for receiving an ammunition belt and means for releasably attaching said belt feeding adapter to the receiver at a position adjacent to said shell pick up position and in a cooperative relationship with said cam follower;

said cam follower having a cam track following portion thereof in engagement with said bolt assembly cam track and being thereby responsive to rearward movement of the bolt assembly from the breech to the recoil position for causing said belt advancing pawl to inwardly advance an ammunition belt held by the belt feeding adapter in a manner moving a shell in the belt into the shell pick up position and being responsive to forward movement of the bolt assembly from the recoil position to the battery position for moving said belt advancing pawl a shell distance outwardly in readiness for advancing the belt the next time the bolt assembly is moved rearwardly to the recoil position; and

e. an ammunition clip holder and means for releasably attaching the clip holder to the receiver in place of the belt feeding adapter and belt advancing pawl.

2. The convertible gun as claimed in claim 1 wherein the belt feeding adapter includes at least one shell anti-back up pawl for preventing a shell in the shell pick up position from being moved outwardly away from said pick up position when the belt advancing pawl is moved outwardly in response to forward movement of the bolt assembly.

3. The convertible gun as claimed in claim 1 wherein said bolt assembly includes a shell extractor and an ejector recess in a region opposite to said extractor and wherein said cam follower includes a shell ejector portion which is caused, responsive to the bolt assembly moving rearwardly from the battery position to the recoil position, to move into said ejector recess and cause ejection, through said shell casing ejection port, of a shell casing held by the shell extractor when the bolt assembly has moved rearwardly to a preestablished position relative to said shell ejection port.

4. The convertible gun as claimed in claim 1 wherein the bolt assembly comprises a bolt and a bolt carrier and wherein the cam track is formed on the bolt carrier.

5. The convertible gun as claimed in claim 1 wherein the cam follower is pivotally mounted at a forward region to the receiver and wherein the cam track engaging portion is rearward of the pivotal mounting region.

6. The convertible gun as claimed in claim 1 wherein the belt advancing pawl is pivotally mounted to the cam follower and is spring-loaded so that when the cam follower is pivoted outwardly, in response to forward movement of the bolt assembly, the belt advancing pawl pivots to a retracted position as the belt advancing pawl is pushed outwardly under a shell in the belt to a position which enables the belt advancing pawl to advance the belt one shell position when the cam follower is subsequently pivoted inwardly in response to the bolt assembly moving rearwardly from the battery position.

7. The convertible gun as claimed in claim 1 wherein the belt feeding adapter comprises a lower, body portion and an upper, cover portion, the body and cover portions being hinged together so that the cover portion can be opened relative to the body portion without detaching the belt feeding adapter from the receiver, an ammunition belt being receivable into the adapter when the cover portion is open and being retained in the belt feeding adapter when the cover portion is then closed.

8. A convertible, belt/clip-fed automatic gun, which comprises:

a. a gun barrel having a breech;

b. a receiver connected to the barrel and having a battery positioned disposed adjacent said barrel breech, a shell pick up position and a shell casing ejection port;

c. a bolt assembly slidably mounted in the receiver for reciprocating movement, in response to firing of the gun, between the battery position and a recoil position rearwardly of the shell pick up position and the shell casing ejection port, the bolt assembly including a bolt having means for picking up a shell from the pick up position upon forward bolt assembly movement and for loading the picked up shell into the barrel breech and, after firing, for extracting a fired shell casing from the barrel breech upon rearward recoil movement from the battery position to the recoil position, and including a bolt carrier having an ammunition belt advancing and casing ejection cam track formed thereon;

d. ammunition belt receiving and advancing means, comprising a cam follower pivotally mounted to the receiver, at least one belt advancing pawl mounted to the cam follower, a belt feeding adapter for receiving an ammunition belt and means for releasably attaching said belt feeding adapter to the receiver at a position adjacent to said shell pick up position and in a cooperative relationship with said cam follower,

said cam follower having a cam track following portion in engagement with said bolt assembly cam track and being thereby responsive to rearward movement of the bolt assembly from the breech to the recoil position for causing said belt advancing pawl to inwardly advance an ammunition belt held by the belt feeding adapter in a manner moving shell in the belt into the shell pick up position and being responsive to forward movement of the bolt assembly from the recoil position to the battery position for moving said belt advancing pawl a shell distance outwardly in readiness for advancing the belt the next time the bolt assembly is moved rearwardly to the recoil position and said belt feeding adapter including at least one shell anti-back up pawl for preventing a shell in the pick up position from being moved outwardly away from said pick up position when the belt advancing pawl in moved outwardly in response to forward movement of the bolt assembly; and

e. an ammunition clip holder and means for releasably attaching the clip holder to the receiver in place of the belt feeding adapter and belt advancing pawl.

9. The convertible gun as claimed in claim 8 wherein said means for extracting a fired shell casing include a shell extractor pivotally mounted to the bolt and an ejector recess formed in a forward region of the bolt opposite said extractor and wherein said cam follower includes a shell ejector portion which is caused, responsive to the bolt assembly moving rearwardly from the breech to the recoil position, to move into said ejector recess in the bolt and cause ejection, through said shell casing ejection port, of a shell casing held by the shell extractor when the bolt assembly has moved rearwardly to a preestablished position relative to said shell ejection port.

10. The convertible gun as claimed in claim 8 wherein the cam follower is pivotally mounted at a forward region to the receiver and wherein the cam track following portion is rearward of said pivotal mounting region.

11. The convertible gun as claimedd in claim 8 wherein the belt advancing pawl is pivotally mounted to the cam follower and is spring-loaded so that when the cam follower is pivoted outwardly, in response to forward movement of the bolt carrier with said cam follower portion if engagement with the bolt carrier cam track, the belt advancing pawl pivots to a retracted position as the belt advancing pawl is pushed outwardly under a shell in the belt to a position which enables the belt advancing pawl to advance the belt one shell position when the cam follower is pivoted inwardly in response to the bolt assembly moving rearwardly from the battery position.

12. The convertible gun as claimed in claim 8 wherein the belt feeding adapter comprises a lower, body por-

tion and an upper, cover portion, the body and cover portions being hinged together so that the cover portion can be opened relative to the body portion without detaching the belt feeding adapter from the receiver, an ammunition belt being insertable in the belt feeding adapter when the cover portion is open and being retained in the belt feeding adapter when the cover portion is then closed.

13. A belt fed automatic gun with positive shell casing ejection, which comprises:

a. a gun barrel having a breech;

b. a receiver connected to the barrel and having a battery position disposed adjacent said barrel breech, shell pick up position and a shell casing ejection port;

c. a bolt assembly slidably mounted in the receiver for reciprocating movement, in response to firing of the gun, between the barrel battery position and a recoil position rearwardly of the shell pick up position and the shell casing ejection port, the bolt assembly having means for picking up a shell from the pick up position upon forward bolt assembly movement and for loading the pick up shell into the barrel breech and, after firing, for extracting a fired shell casing from the barrel breech upon rearward recoil movement from the battery position to the recoil position, said bolt assembly having an ammunition belt advancing and shell casing ejection cam track formed thereon, said bolt assembly including a shell extractor and an ejector recess in a region opposite to said extractor;

d. ammunition belt receiving and advancing means, comprising a cam follower pivotally mounted to the receiver, at least one belt feeding adapter for receiving an ammunition belt and and means for releasably attaching said belt feeding adapter to the receiver at a position adjacent to said shell pick up position and in a cooperative relationship with said cam follower,

said cam follower having a cam track following portion thereof in engagement with said bolt assembly cam track and being thereby responsive to rearward movement of the bolt assembly from the battery position to the recoil position for causing said belt advancing pawl to inwardly advance an ammunition belt held by the belt feeding adapter in a manner moving a shell in the belt into the shell pick up position and being responsive to forward movement of the belt assembly from the recoil position to the battery position for moving said belt advancing pawl a shell distance outwardly in readiness for advancing the belt the next time the bolt is moved rearwardly to the recoil position, said cam follower including a shell ejector portion which is caused, responsive to the bolt assembly moving rearwardly from the battery position to the recoil position, to move into said bolt assembly ejector recess and cause ejection, through said shell casing ejection port, of a shell casing held by the shell extractor when the bolt assembly has moved rearwardly to a preestablished position relative to said shell ejection port.

14. The automatic gun as claimed in claim 13 wherein the belt feeding adapter includes at least one shell anti-back up pawl for preventing a shell in the pick up position from being moved outwardly away from said pick up position when the belt advancing pawl is moved outwardly in response to forward movement of the bolt assembly.

15. The automatic gun as claimed in claim 13 including an ammunition clip holder and means for releasably attaching the clip holder to the receiver in place of the belt feeding adapter and belt advancing pawl.

16. The automatic gun as claimed in claim 13 wherein the bolt assembly comprises a bolt and a bolt carrier and wherein the cam track is formed on the bolt carrier.

17. The automatic gun as claimed in claim 13 wherein the cam follower is pivotally mounted at a forward region to the receiver and wherein the cam track engaging portion is rearward of the pivotal mounting region.

18. The automatic gun as claimed in claim 13 wherein the belt advancing pawl is pivotally mounted to the cam follower and is spring loaded so that when the cam follower is pivoted outwardly, in response to forward movement of the bolt assembly, the belt advancing pawl pivots to a retracted position as the belt advancing pawl is pushed outwardly under a shell in the belt to a position which enables the belt advancing pawl to advance the belt one shell position when the cam follower is subsequently pivoted inwardly in response to the bolt assembly moving rearwardly from the battery position.

19. The automatic gun as claimed in claim 13 wherein the belt feeding adapter comprises a lower, body portion and an upper, cover portion, the body and cover portions being hinged together so that the cover portion can be opened relative to the body portion without detaching the belt feeding adapter from the reciever, an ammunition belt being receivable into the belt feeding adapter when the cover portion is open and being retained in the belt feeding adapter when the cover portion is then closed.

20. The automatic gun as claimed in claims 1, 8 or 13 wherein the cam trach comprises a substantially linear recess formed at an angle of between substantially 5° and 10° relative to a bore axis of the gun.

21. The automatic gun as claimed in claim 20 wherein said angle is substantially 6°.

22. The automatic gun as claimed in claims 1, 8 or 15 wherein the clip holder and the means for attaching the clip holder to the receiver are configured for holding a clip at angle causing the clip to be out of the sight path of the gun.

* * * * *